Question 1

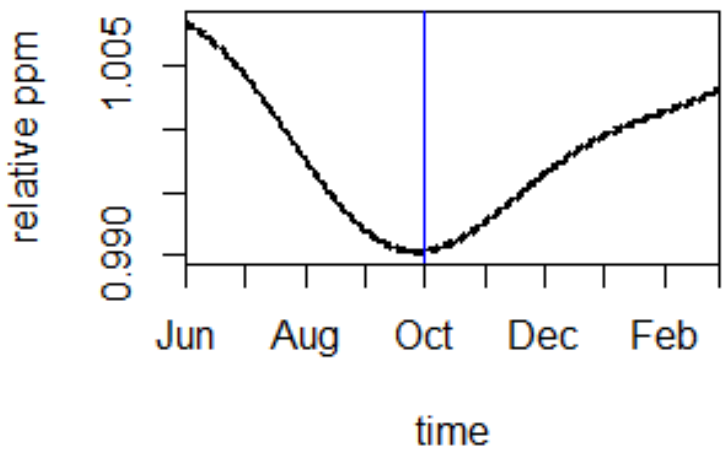

Figure 1: CO2 rate with October 1973 highlighted

In today's society, the rate of CO2 in the atmosphere is a major indicator for global warming issues. It's interesting to see whether or not some major events from 1973 to 2015 have any impacts on this matter.

In this analysis, I treat co2 as the response variable. I treat cos12 and sin12 as annual cyclical predictors, and cos6 and sin6 as semiannual cyclical predictors. I kept the prior for the INLA model as 'pc.prec" since i could not find strong patterns that suggest otherwise.

From Figure 1, after OPEC oil embargo the rate of co2 increases while before this event, the rate of co2 was decreasing. From Figure 2, during the global

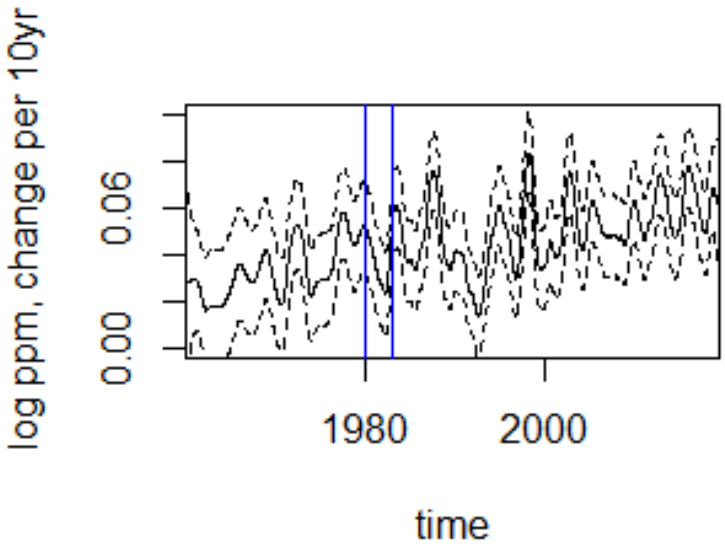

Figure 2: CO2 rate with 1980 and 1982 highlighted

economic recessions around 1980-1982, rate of co2 is decreasing, while it was decreasing before this event. From Figure 3, after the fall of the Berlin wall, the rate of co2 saw a short and steep downward trend. From Figure 4, after China joining the WTO, the growth rate kept increasing but with a lower growth rate. From Figure 5, the growth rate of co2 kept decreasing since start of the most recent global financial crisis, however, the rate of decrease become lower. Then after about one month, the rate of co2 began to increase. From Figure 6, after the signing of the Paris Agreement on 12 December 2015, the rate of co2 is still increasing, however, the growth rate becomes lower.

berlin wall.png

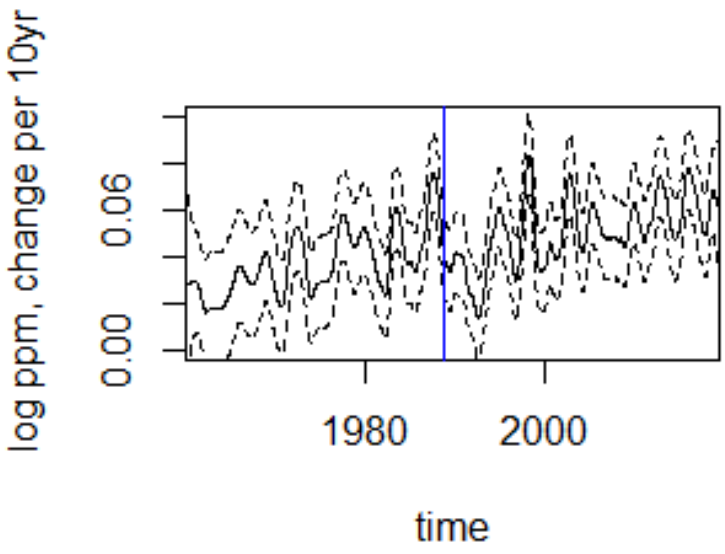

Figure 3: CO2 rate with October 1989 highlighted

Question 2

Global warming is a major concern in today's society. IPCC has made a statement about this matter. It's interesting to see whether or not temperature data recorded on Sable Island supports IPCC's statement.

I treat max daily temperature as response variable, I treat cos12 and sin12 as annual cyclical predictors, and cos6 and sin6 as semiannual cyclical predictors. To help address IPCC's statement. I have plotted temperature vs time from 1980 to the present. Additionally, I have plotted the predicted temperature up to the year of 2052.

From Figure 7, the plot suggests that there's indeed around 0.8 to 1.2 degree

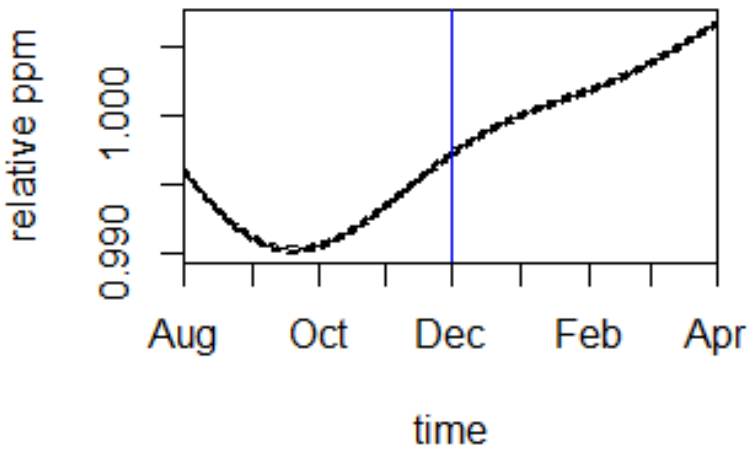

Figure 4: CO2 rate with 11 December 2001 highlighted

of increase in daily max temperature in 2019 compared with that in 1980. This finding supports IPCC's statement. From Figure 8, the plot suggests that at a point between 2030 to 2052, the predicted daily max temperature indeed increased by 1.5 degree. This finding also support IPCC's statement.

In conclusion, the analysis of temperature data recorded on Sable Island supports IPCC's statement.

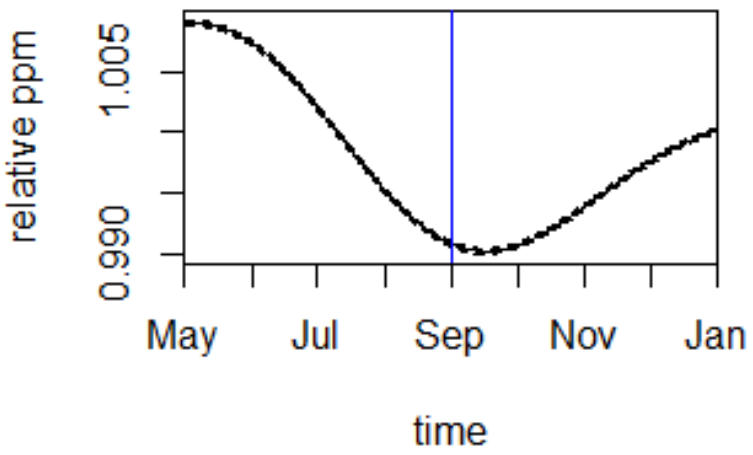

Figure 5: CO2 rate with 15 September 2008 highlighted

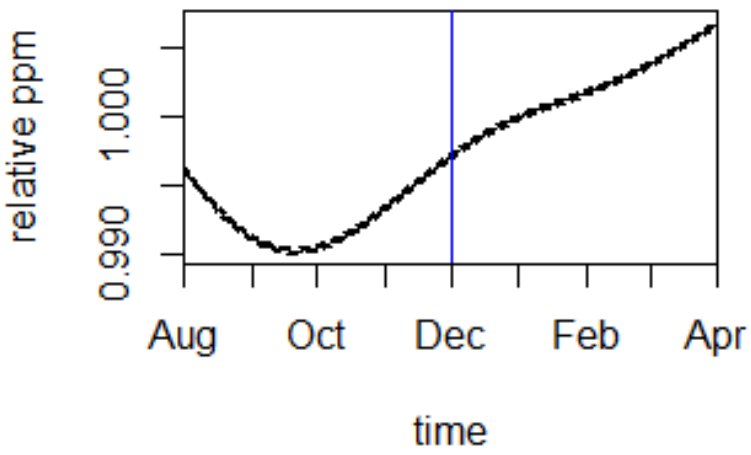

Figure 6: CO2 rate with 12 December 2015 highlighted

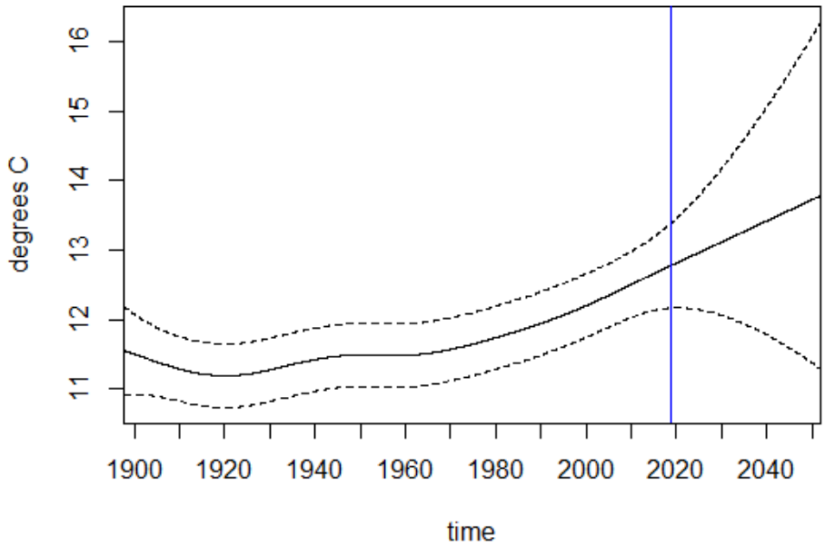

Figure 7: daily max temperature with 2019 highlighted

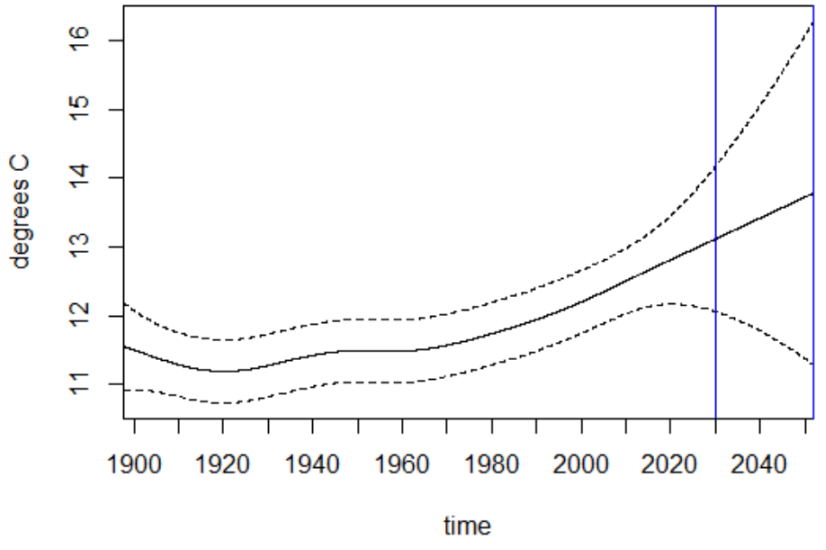

Figure 8: daily max temperature with 2030 and 2052 highlighted